

## Translation and validation of Persian version of Index of Dental Anxiety and Fear (IDAF-4C<sup>+</sup>)

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### Original Article

#### Abstract

**BACKGROUND AND AIM:** Being able to measure dental anxiety and fear is a necessary prerequisite for studying and understanding the nature and consequences of this common fear. Index of Dental Anxiety and Fear (IDAF-4C<sup>+</sup>) is the latest scale presented for the assessment of dental anxiety, but it has never been applied in Iran. The aim of this study was to validate the IDAF-4C<sup>+</sup> for use among Persian population.

**METHODS:** In this cross-sectional study, 334 dental patients participated. The English original version of the IDAF-4C<sup>+</sup> questionnaire was translated into Persian language by a forward-backward translation method. Reliability was determined by internal consistency using Cronbach's alpha and test-retest method measuring by intraclass correlation coefficient (ICC). Dental Anxiety Scale (DAS) was used to assess convergent validity using Pearson correlation coefficients. The relationship between demographic characteristics of age, sex, economical status, and income with dental anxiety also was assessed.

**RESULTS:** The Cronbach's alpha coefficient of the IDAF-4C<sup>+</sup> was 0.91. The coefficient of test re-test reliability was 0.84 [95% confidence interval (CI): 0.81-0.87]. Pearson correlation coefficient between IDAF-4C<sup>+</sup> and DAS was statistically significant at  $P < 0.001$  ( $r = 0.74$ ). In our study, fear and anxiety among women and patients with low income were significantly high.

**CONCLUSION:** The Persian version of IDAF-4C<sup>+</sup> is a reliable and valid tool to measure dental anxiety and fear among Persian population.

**KEYWORDS:** Dental Anxiety; Validation Studies; Reliability; Validity

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Dental fear and anxiety (DFA) is defined as anxiety anticipated in a dental visit. It has been introduced as the fifth most common cause of anxiety.<sup>1,2</sup> It is estimated that up to 13% of individuals suffer from severe anxiety.<sup>3-5</sup>

DFA is recognized as one of the most important factors that leads to dental avoidance.<sup>1</sup> As patients refuse to go to the dentist, this will result in poor oral health and influence their quality of life considerably.<sup>6</sup> Therefore, a theoretical and efficient way of

measuring DFA in order to manage it properly has always been sought by the practitioners. With that in mind, different scales have been developed; however, many shortcomings have been attributed to them.<sup>2,7</sup> For example, Dental Anxiety Inventory (DAI) is not popular because of large numbers of items in the scale.<sup>8</sup> Dental Anxiety Scale (DAS)<sup>9</sup> is another measure that is the most widely-used measure in the world and also in the population of Iran.<sup>3,10</sup> However, it has some flaws such as: the theoretical basis upon

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it the measure is developed has not been elucidated, it is limited to measure only the emotional component of fear, it is not able to distinguish between different levels of dental fear, and it has poor response scales.<sup>11,12</sup>

With the aim of resolving the mentioned deficiencies of previous measures of DFA, Armfield invented the original English version of "Index of Dental Anxiety and Fear (IDAF-4C<sup>+</sup>)" scale in 2010, and it was evaluated in a population in Australia. It is designated based on the theoretical rules and the structure has three modules of DFA, dental phobia, and stimulus. This measure will give you information about these issues: who is a dental anxious patient, the rate of the severity and different components of DFA, the stimulating factors that incite anxiety in the patient, and who is suspected to suffer from dental phobia.<sup>13</sup> Dental phobia is referred to the situation when an individual is distressed by his/her dental anxiety and this interferes with normal functioning, social activities, and occupation.<sup>1,14</sup> Furthermore, because feeling of anxiety in an individual may be originated from psychological and social states beyond a simple dental stimulating factor, two items related to "panic disorder" and "social phobia" have been included in this measure as well.<sup>13</sup>

The aim of the present study is to make a transcultural translation of the IDAF-4C<sup>+</sup> measure into Persian language, examine the reliability and validity of the Persian version of this measure, and evaluate the relationship between some demographic characteristics of an Iranian population with the DFA.

## Methods

This cross-sectional study was approved by the Ethics Committee and Vice-Chancellor for Research of Kerman University of Medical Sciences, Kerman, Iran (ethical approval code number: IR.KMU.REC.1393.565). Sampling in this study was performed using convenience method, and willing adult patients (15-65 years old) getting treatment in dental clinics in Kerman were investigated and they were

assured that their information would remain confidential.

Considering the available texts,<sup>15,16</sup> the sample size was calculated 330 subjects. Due to the possibility of subjects dropping out of the study, 400 individuals were included to the study.

*Translation of the questionnaire:* The original questionnaire was translated from English to Persian by cross-cultural adaptation process; at first, a translator competent in translating specialized English texts was asked to transfer the questionnaire independently. The questionnaire was then transcribed back to English by someone expert in Persian-English translation; this person was unaware about existence of the original questionnaire in English. Next in order to maintain the content validity, the transcribed text was compared to the original text by a specialist team in psychology and dentistry, and the final draft was obtained. In order to check the face validity, 10 graduate and undergraduate students were asked to look over the text as to test the intelligibility of its context. For the final validation, a dentist fluent in English was asked to compare both translations and point to any ambiguity in their meaning. In the end, the questionnaire was sent to its original author and after final modifications, it was used in the study.

Each study subject completed two Persian-translated questionnaires of IDAF-4C<sup>+</sup> and DAS. An information form, including age, gender, marital status, economical status, and education, was also given to the subjects. IDAF-4C<sup>+</sup> questionnaire includes 23 questions in 3 separate sections. The first section, the main part of the questionnaire, determines the levels of DFA and includes 8 questions. A Likert scale is used to answer these questions.<sup>15</sup> The score range is from 8 to 40.

The "+" sign in the IDAF-4C<sup>+</sup> measure stands for the second and third sections, dental phobia and stimulus modules, respectively.

The phobia module (IDAF-P) comprises of 5 questions. The first three questions are

designated to recognize the patients with dental phobia and the other two questions screen for the two psychological states of panic disorder and social phobia, respectively.<sup>17</sup> The scoring system for this part of the measure is a "Yes" or "No" type. The score range is from 5 to 10.

The stimulus module (IDAF-S) comprises of 10 items. The patient should determine to what extent she/he feels anxious about each of these items. The scoring of this part of the measure is from "Not at all" (score = 1) to "Very much" (score = 5) for each item and it is ranged from 10 to 50.

DAS includes four items related to DFA and asks how the patient feels if he/she is going to the dentist tomorrow, if she/he is sitting in the waiting room in the dental office, if she/he is waiting for the dentist to prepare the tooth-drill device, and if she/he is waiting for teeth scaling and polishing treatment. The DAS instrument is wisely valid and reliable and the range for total mean score of this measure is 4-20. This value for IDAF-4C<sup>+</sup> is 23-100.<sup>9,10</sup>

In order to assess the validity of the IDAF-4C<sup>+</sup>, the DAS scale was utilized. The correlation between these two scales was measured using Pearson correlation coefficient. Reliability of the scale, based on the concept of internal consistency, was evaluated using Cronbach's alpha. The test-retest reliability of the IDAF-4C<sup>+</sup> was measured using intraclass correlation coefficient (ICC) at two-week follow-up in 15 participants.

The correlation of the demographic

characteristic of age with the IDAF-4C<sup>+</sup> mean score was evaluated using Pearson correlation coefficient; for sex and marital status independent sample t-test and for economic status and education level one-way analysis of variance (ANOVA) were used. Post-hoc test was used to make pairwise comparisons.  $P < 0.05$  was considered statistically significant. All data analysis was done using SPSS software (version 16, SPSS Inc., Chicago, IL, USA).

## Results

In this study, 334 subjects including 129 men (38.4%) and 205 women (61.6%) were investigated (the response rate was 83%). The average age of these participants was  $30.3 \pm 10.6$  years.

Cronbach's  $\alpha$  coefficient for reliability of the whole questionnaire was equal to 0.91. This coefficient was also calculated for each section of the questionnaire separately. The Corrected Item-Scale Correlation (CISC) of all included questions is mentioned in tables 1, 2, and 3.

To determine the questionnaire reliability in re-evaluating, ICC of 0.84 was obtained [95% confidence interval (CI): 0.81-0.87]. This coefficient for the first section was 0.87 (CI: 0.78-0.89), for the second section was 0.66 (CI: 0.51-0.77), and for the third section was 0.82 (CI: 0.76-0.87).

To assess the questionnaire validity, Pearson correlation coefficient was determined between IDAF-4C<sup>+</sup> and DAS questionnaires as equal to 0.74.

**Table 1.** Results for evaluation of reliability of the scale based on Cronbach's coefficient and corrected item-scale correlation (CISC) (first module)

Internal consistency			
Item	CISC*	$\alpha^{**}$	Cronbach's alpha
Feeling anxious before going to the dentist	0.65	0.88	0.89
Avoiding going to the dentist	0.63	0.88	
Getting nervous or edgy	0.71	0.87	
Thinking that something really bad would happen	0.64	0.88	
Feeling afraid or fearful	0.80	0.86	
Faster heart beating	0.73	0.87	
delaying making appointments	0.61	0.88	
Thinking about all things that might go wrong	0.59	0.89	

\*Corrected item-scale correlation, \*\*Cronbach's  $\alpha$  if item deleted  
CISC: Corrected item-scale correlation

**Table 2.** Results for evaluation of reliability of the scale based on Cronbach's coefficient and corrected item-scale correlation (CISC) (second module)

Item	Internal consistency		
	CISC*	$\alpha^{**}$	Cronbach's alpha
Avoiding to go to the dentist with intense fear	0.61	0.53	0.68
Fear being present for at least 6 months	0.39	0.65	
Affecting the different aspects of life	0.47	0.61	
To be concerned about having a panic attack	0.39	0.64	
To be afraid of being judged or watched in social situations	0.32	0.67	

\*Corrected item-scale correlation, \*\*Cronbach's  $\alpha$  if item deleted

CISC: Corrected item-scale correlation

In addition, the correlation between the first section of the questionnaire and the second section was 0.68, the correlation with the third section was 0.65, and the correlation with DAS questionnaire was 0.68 ( $P < 0.001$ ). Mean scores of the IDAF-4C<sup>+</sup> and DAS scales is shown in table 4.

In this study, although IDAF-4C<sup>+</sup> had no significant relation with age ( $P = 0.210$ ), education ( $P = 0.820$ ), and marital status ( $P = 0.750$ ) variables, a significant relation was observed between this measure and gender and economical status of the individuals ( $P < 0.050$ ). According to the post-hoc tests, people with weaker economic status showed signs of greater anxiety in comparison to others. The results are shown in table 5.

## Discussion

In this study, IDAF-4C<sup>+</sup> questionnaire was translated into Persian and its validity and reliability were proved. The reliability based on Cronbach's  $\alpha$  coefficient was equal to 0.91 which is much higher than the standard value

(0.70).<sup>18</sup> This coefficient was 0.89 for the first section. In the original document, this value was calculated 0.91 by Armfield.<sup>13</sup> While for Finnish, Spanish, Swedish, and Turkish versions this value was 0.94, 0.88, 0.95, and 0.96, respectively.<sup>15,16,19,20</sup> The small differences in this coefficient could be due to different study populations, social cultures, and participants' precision in answering the questions.

In the present study, based on CISC values almost all questions showed a correlation higher than the lowest acceptable value (0.40) except for two questions in the second and third modules related to "measuring levels of social phobia" and "the cost of dentist". This could be justified due to the different nature of these two questions. To verify this, Spanish version of the questionnaire as well showed that the question related to social phobia had the lowest correlation.<sup>16</sup> In addition, question about the cost of dental treatments (in third section) in Spanish and Australian studies also had the lowest correlation with score in section IDAF-4C.<sup>13,16</sup> Therefore, there was no need to change or delete any questions.

**Table 3.** Results for evaluation of reliability of the scale based on Cronbach's  $\alpha$  coefficient and corrected item-scale correlation (CISC) (third module)

Item	Internal consistency		
	CISC*	$\alpha^{**}$	Cronbach's alpha
Painful treatment	0.56	0.84	0.85
Feeling embarrassed	0.46	0.85	
No control	0.61	0.83	
Feeling queasy or disgusted	0.68	0.83	
Numbness	0.59	0.83	
Not knowing what the dentist is going to do	0.57	0.84	
Cost	0.39	0.85	
Injection needle	0.64	0.83	
Gagging or Choking	0.62	0.83	
Unsympathetic dentist	0.47	0.85	

\*Corrected item-scale correlation, \*\*Cronbach's  $\alpha$  if item deleted

CISC: Corrected item-scale correlation

**Table 4.** Scores of different sections of the Index of Dental Anxiety and Fear (IDAF-4C+) and Dental Anxiety Scale (DAS)

Variable	Minimum	Maximum	Mean ± SD
IDAF-4C+	23	94	47.1 ± 15.5
First section	8	40	16.8 ± 7.8
Second section	5	10	6.0 ± 1.3
Third section	10	50	24.5 ± 8.3
DAS	4	20	10.3 ± 4.2

IDAF-4C+: Index of dental anxiety and fear; DAS: Dental anxiety scale; SD: Standard deviation

**Table 5.** Results for investigating the relationship between demographic characteristics of study subjects with Index of Dental Anxiety and Fear (IDAF-4C+) score

Variable	Score			P
	n (%)	Mean ± SD		
Gender				0.010
Men	127 (38.0)	43.24 ± 13.35		
Women	204 (62.0)	49.62 ± 16.43		
Economic status				0.002
Excellent	9 (3.0)	37.57 ± 12.42**		
Good	109 (36.0)	46.16 ± 15.43**		
Average	155 (52.0)	45.85 ± 14.07**		
Weak	26 (9.0)	57.56 ± 18.46*		
Marital status				0.750
Single	135 (41.0)	46.82 ± 15.63		
Married	193 (59.0)	47.39 ± 15.65		
Education				0.820
Lower than diploma	50 (15.4)	46.32 ± 14.85		
Diploma	133 (40.9)	47.22 ± 15.71		
Bachelor	100 (30.7)	47.64 ± 16.23		
Master	27 (8.4)	46.18 ± 14.33		
PhD	15 (4.6)	46.37 ± 13.52		

SD: Standard deviation

The mean IDAF-4C value with variant symbols was statistically different from others.

In the present study, ICC of 0.84 (95% CI: 0.81-0.87) was obtained to validate questionnaire by using the test-retest method; this value is closely similar to the value calculated in a study with the Turkish version of the questionnaire (ICC = 0.87), although the age group of this study varied from our survey, as it was done on a population of children.<sup>20</sup> The coefficient was also calculated for the first section (0.87) and it was almost similar to the results of the Australian (0.82) and Spanish (0.83) studies.<sup>13,16</sup> In our study, ICC of 0.66 (95% CI: 0.51-0.77) was obtained for the second section as well; this value (ICC) in Australia was 0.57 to 0.67 and in Spain was equal to 0.22 to 1. In addition, the calculated value for the third

section was 0.82 (95% CI: 0.76-0.87) which was 0.55 to 0.73 in Australia and 0.55 to 0.78 in Spain.<sup>13,16</sup> Time difference between test and re-test and also different sample sizes in these studies could be considered as justification for differences between distinguished values of ICC.

The present study used convergent validity to evaluate the questionnaire, and its correlation with DAS questionnaire was equal to 0.74, and this was 0.68 when correlating the first section with DAS questionnaire; this value was lower than what was obtained (0.84) by the original version of the questionnaire.<sup>13</sup> Lack of accurate investigation in validating the Persian version of DAS and smaller sample size of our study are the reasons for this different in results. To validate, Finnish and Spanish versions used modified DAS (MDAS) questionnaire which, respectively, showed 0.74 and 0.76 for Pearson correlation coefficient.<sup>15,16</sup>

Based on the results of this study, individuals with weak economic status showed higher levels of anxiety in comparison to other individuals. The same results were obtained by Armfield.<sup>13</sup> Since previous studies point to the connection between unpleasant prior dental experience and DFA, we may conclude that low quality dental services for people with lower income are the cause of this problem.<sup>1</sup>

Moreover, the present study showed that DFA in women is higher; Armfield<sup>13</sup> and Carrillo-Diaz et al.<sup>16</sup> also reached the same conclusion in their studies. On the other hand, in the Finnish version of IDAF-4C+ questionnaire, no significant difference



between levels of anxiety between men and women was found.<sup>15</sup>

Regarding the limitations of this research, it should be noted that the responsiveness of the questionnaire has not been examined, so it is recommended to investigate further research.

According to the results of this study, the Persian version of the IDAF-4C<sup>+</sup> is appropriately reliable and valid. Hence, you can take advantage of that in diagnosis of dental anxiety in every day practice in dentistry and also in epidemiologic researches with the purpose of planning and purchasing major educational and therapeutic programs.

The modular approach of the IDAF-4C<sup>+</sup> is very functional and unique. The core fear module enables you to diagnose DFA in the patient. The phobia module is useful to screen patients suffering from three separate psychological complications of "dental phobia", "panic disorder", and "social phobia". Positive results of the measure for each of these three requires additional psychiatric consultation for definitive diagnosis and treatment.<sup>13,15</sup> The stimulus

module scores and its relationship with the core fear module helps identify DFA stimulating factors, therefore, improves the quality of received dental treatments by the patients as well as their oral health.

### Conclusion

Application of an international measurement tool for DFA in different nations requires its complete adaptation to the cultural and social conditions of the target society; this study sought to validate the translated version of IDAF-4C<sup>+</sup> questionnaire. Based on the results of this research, IDAF-4C<sup>+</sup> in Persian is valid and reliable and could be used in studies concerned with evaluation of DFA among patients.

### Conflict of Interests

Authors have no conflict of interest.

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